

10/521307

Rec'd PCT/PTO 13 JAN 2005

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
22 January 2004 (22.01.2004)

PCT

(10) International Publication Number  
WO 2004/007778 A1

(51) International Patent Classification<sup>7</sup>: C21C 5/56, 5/52

CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NL, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number: PCT/GB2003/003069

(22) International Filing Date: 15 July 2003 (15.07.2003)

(25) Filing Language: English

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(26) Publication Language: English

(30) Priority Data: 0216544.7 17 July 2002 (17.07.2002) GB

(71) Applicant and  
(72) Inventor: WARNER, Noel, Alfred [GB/GB]; 40 High House Drive, Rednal, Birmingham B45 8ET (GB).

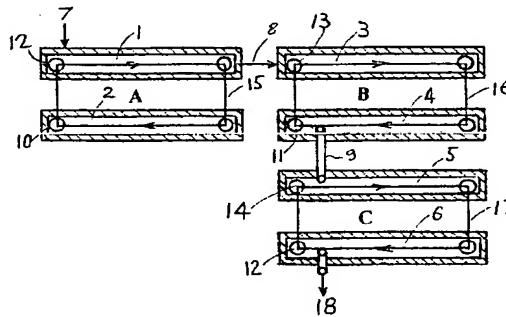
**Published:**

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(74) Agent: WARD, David, I.; Marks & Clerk, Alpha Tower, Suffolk Street Queensway, Birmingham B1 1TT (GB).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CONTINUOUS STEELMAKING PLANT



WO 2004/007778 A1

(57) **Abstract:** The present invention provides a process plant for the production of molten steel from primary and/or secondary ferrous materials in which no free oxygen is permitted to contact directly carbon-containing iron melts, comprising: (i) at least three pairs of furnaces (1,2; 3,4;5,6), each furnace of a pair having a hearth base (36) and being interconnected so as to form a continuous flowpath loop for molten metal, the first pair (1,2) defining an iron making loop (A) and the second and third pair (3,4;5,6) defining primary and secondary steel refining loops (B,C) respectively, (ii) means (8) for transferring molten metal from the ironmaking loop (A) to the first refining loop (B) and from the first refining loop (B) to the second refining loop (C), (iii) means for controllably supplying heat to, and removing heat from metal in the furnaces (1,2,3,4,5,6), whereby, in use a central region of metal (19a) in the furnace (1,2,3,4,5,6) becomes or is maintained in its molten state and a peripheral region of the metal (20) is maintained in a solid state such that the molten metal (19a) is contained within a stable solid shell of metal (20), said solid metal shell (20) defining the walls of the furnace (1,2,3,4,5,6), (iv) for each furnace (1,2,3,4,5,6), a removable lid (23), an enclosed space (25) being defined between the hearth (36), the lid (23) and the solid metal shell (20) defining the walls of the furnace (1,2,3,4,5,6), (v) a lifting arrangement (34,35) for controllably raising out of and lowering into the melt any plant items, so that upon shut down, said items can be removed prior to solidification of the molten metal (19a).